



REPORT TO THE CONGRESS

Increased Use Of
Computer-Output-Microfilm
By Federal Agencies
Could Result In Savings

B-115369

***BY THE COMPTROLLER GENERAL
OF THE UNITED STATES***

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-115369

To the Speaker of the House of Representatives
and the President pro tempore of the Senate

This is **our** report entitled "Increased Use of Computer-
Output-Microfilm by Federal Agencies Could Result in Savings."

We made our review pursuant to the Budget and Accounting
Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act
of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Administra-
tor of General Services; the Director, Office of Management
and Budget; and heads of other Federal departments and
agencies.

A handwritten signature in cursive script, reading "James B. Stacks", is positioned above the title.

Comptroller General
of the United States

C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	COM	1
	Cost of COM equipment	4
	Government-wide COM responsibility	4
	scope of review	5
2	COM SYSTEM ADVANTAGES AND DISADVANTAGES	6
	production costs	6
	Storage costs	8
	Reproduction costs	8
	Faster information retrieval	8
	Faster computer output	8
	Versatile output formats	9
	Easier handling and distribution	9
	Strangeness of COM	10
	Lack of knowledge	10
3	COM USE BY FEDERAL AGENCIES	11
	Agencies using COM	11
	COM applications	11
	DSA	12
	Navy Federal catalog data minia- turization program	12
	Master data record at Naval Air Rework Facility	14
	Army Materiel Command inventory application	14
	Marine Corps payroll	15
4	METHODS OF PROVIDING COM SERVICES	16
	In-house COM installations	16
	COM service centers	17
	Proposal for COM study	18
5	CONCLUSIONS, RECOMMENDATIONS, AND AGENCY ACTIONS	20
	Conclusions	20
	Recommendations	20
	Agency actions	20

APPENDIX

Page

- | | | |
|----|---|----|
| I | Letter dated August 28, 1974, from the
Assistant Administrator, General
Services Administration, to GAO | 23 |
| II | Letter dated August 19, 1974, from the
Assistant Secretary of Defense to GAO | 25 |

ABBREVIATIONS

ADP	automatic data processing
COM	Computer-Output-Microfilm
DOD	Department of Defense
DSA	Defense Supply Agency
GAO	General Accounting Office
GSA	General Services Administration
HEW	Department of Health, Education, and Welfare
MDR	master data record
MINICATS	miniaturization of the Federal Catalog Systems
NAS	Naval Air Station
NMDL	Navy Management Data List

COMPTROLLER GENERAL'S
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INCREASED USE OF
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BY FEDERAL AGENCIES
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D I C E S T

WHY THE REVIEW WAS MADE

Computer-Output-Microfilm (COM) is a technology enabling the output of computers to be recorded directly on microfilm rather than on paper.

GAO made this review to study COM use by Federal agencies, to determine whether COM could improve the efficiency and economy of computerized information systems, and to explore service centers as a means of providing COM services.

FINDINGS AND CONCLUSIONS

COM is a blending of the computer, microphotography, and electronics. A COM system usually consists of a recorder/developer and a reader.

The recorder reads the computer's magnetic tape and transforms the data onto microfilm, which is developed. The reader is used to read the developed film. (See p. 1.)

Generally, the COM recorder/developer can be rented for less than \$50,000 a year and readers may be purchased

for between \$70 and \$4,000, depending on sophistication and capabilities. (See p. 4.)

Organizations installing COM systems have obtained benefits, including

- lower cost,
- faster information output,
- more versatile output formats, and
- easier handling and distribution of computer reports.

A Defense Supply Agency study indicated that producing computer-output data on microfilm costs about one-fourth as much as producing data on paper.

A GAO analysis of reports at eight Federal activities and discussions with report users indicate that about 1.2 million pages of an estimated 3.9 million pages of reports produced monthly could be converted to microfilm at an

estimated annual savings of nearly \$1 million. (See p. 6.)

In addition, it is less expensive to store and reproduce COM reports than paper reports. (See p. 8.)

Computer output on microfilm can be retrieved faster than data printed on paper. Studies made by industry indicate that, on the average, 4 minutes are required to retrieve needed information from a paper printout, but only 1 minute is needed to retrieve information from film. With the more sophisticated COM systems, retrieval time can be decreased further. (See p. 8.)

A supply control system at the Naval Supply Center, Charleston, South Carolina, uses microfilm to produce stock status reports and other inventory information. Employees now spend about 800 man-hours to retrieve stock status information, compared with about 2,500 man-hours required when paper was used. (See p. 8.)

Computer printers are generally the slowest part of computer systems and frequently become a bottleneck, slowing system output. Microfilm recorders operate faster than printers and can produce as much output in a given period as 30 printers. (See pp. 8 and 9.)

Normal paper printouts are

large, bulky, heavy, and difficult to handle, whereas microfilm is compact and easy to handle. A single microfiche 1/ can hold 270 pages of printed data. (See p. 9.)

Although COM offers many advantages, there has been a reluctance in some cases to use it. Major factors which inhibit development and acceptance of COM systems follow.

- - Practically everyone has worked with paper and is comfortable with it. (Since microfilmed reports are new and different, some people tend to reject them.)
- COM reports require a machine for reading and cannot be written upon. (People used to reading and marking paper reports are reluctant to change their methods and accept COM reports.) (See pp. 9 and 10.)

COM systems began emerging in 1958 but did not gain widespread acceptance in Government and industry for a decade. In 1968 only 150 COM systems were in use in the United States; by 1972 over 1,000 were in use. Industry estimates indicate that over 3,000 COM systems will be in use by 1975.

1/ A piece of film usually 4" by 6".

The Federal Government is now a major COM user. Agencies having equipment or planning to acquire it include the Department of Defense (DOD); the Department of Health, Education, and Welfare (HEW); the Department of the Treasury; the General Services Administration (GSA); the United States Postal Service; the Atomic Energy Commission; and the National Aeronautics and Space Administration. (See p. 11.)

Other agencies share COM equipment procured by the above agencies or purchase services from commercial service centers. (See p. 11.)

Some agencies have acquired COM recorders and developers on the basis of their needs without considering whether other agencies could share them. The capacity of this equipment is large. Generally, a single agency does not have enough computer output to keep a recorder and developer operating full time. (See pp. 16 and 17.)

When an agency has a COM recorder/developer for its exclusive use, the equipment is frequently underused. (See p. 17.)

The Naval Air Station in Norfolk, Virginia, installed COM equipment in May 1972 to test and explore its use. The COM reader and developer were tailored to fit Station needs

and automatic data processing (ADP) equipment characteristics without considering whether other agencies had need for COM services.

Even though the Station uses only about 4.3 percent of its COM equipment's capacity, it has provided few services to other agencies. A more efficient way of using COM equipment appears to be through establishing service centers. (See p. 16.)

Service centers providing diverse, prompt services could make COM's advantages available to many Federal agencies and increase equipment use. Other advantages of these centers are lower startup costs and savings through economies of scale. (See p. 17.)

A service center would centralize at one place a high degree of expertise where users could obtain answers to their COM questions and thereby enhance COM's early acceptance for appropriate applications and avoid inappropriate applications. (See p. 17.)

Although COM service centers have been established in the Government, they have not been accepted Government-wide. HEW operates a COM center in the Washington, D.C., area. Use of the center has expanded, and the Center is about to start a two-shift-a-day operation. (See p. 18.)

To encourage establishment of COM centers, GAO suggested a joint pilot project with the Office of Management and Budget, GSA, and DOD to establish a center in the Norfolk area. The Navy Publication and Printing Service agreed to be the COM service center for the project.

A steering committee headed by a DOD representative is directing the effort. The committee will deal with problems in operating the center and will consider whether standards for COM are needed since there is a variety of equipment available. (See pp. 18 and 19.)

COM has potential for improving the economy and efficiency of Government information systems. Increased use in such areas as payroll could decrease operating costs and yield other advantages.

A major factor inhibiting COM's full exploitation is that many Federal managers and system designers are unaware of its benefits.

Service centers could provide economical COM services, and, as COM becomes widely accepted and the demand for services grows, greater economies could result. GSA should start a program to make Federal managers and system designers more aware of COM benefits.

Pending completion of the pilot

project, GSA should encourage agencies to use COM centers where possible, instead of obtaining their own COM recorders and developers.

RECOMMENDATIONS

GAO recommends that, to provide for orderly and productive use of COM equipment, GSA:

- Inform Federal managers of the benefits of using COM.
- Suggest that agencies investigate whether COM could increase productivity and lower the cost of information systems.
- Encourage Federal agencies to share existing COM equipment, especially in areas where Federal agencies are concentrated. (See p. 20.)

AGENCY ACTIONS

To make Federal managers more aware of the advantages of COM, GSA is preparing a handbook on the analysis and design of COM information systems and is sponsoring a Federal Government Micrographics Council. Shared COM use will be promoted as part of the Government-wide ADP Sharing Program, and the activities of the Micrographics Council and availability of the COM handbook will be publicized. According to GSA, procurement requests for COM equipment and services are reviewed as part of the ADP Sharing Program.

GSA plans to strengthen its efforts by revising the Federal Property Management Regulations to make agencies more aware that COM equipment and services are included in the ADP Sharing Program. (See app. I for GSA comments.)

Because many of the COM installations discussed in the report are military, GAO asked DOD for its comments. DOD concurred with the conclusions and recommendations.

The Assistant Secretary of Defense said that the report should provide needed emphasis on COM as an alternative to printed computer output and should increase the efficiency of existing and planned COM usage through sharing of resources or service center support. He said DOD would

continue working closely with GAO and GSA to exploit the full potential of COM. (See app. II for DOD comments.)

MATTER FOR CONSIDERATION BY
THE CONGRESS

This report is provided to the Congress because of its continuing interest in the efficient and economical use of computers.

GAO believes it will be helpful to congressional committees considering agency requests for additional funds to augment ADP systems.

Committees having oversight responsibility for GSA may be interested in the effectiveness of GSA's efforts to encourage more COM use.

CHAPTER 1

INTRODUCTION

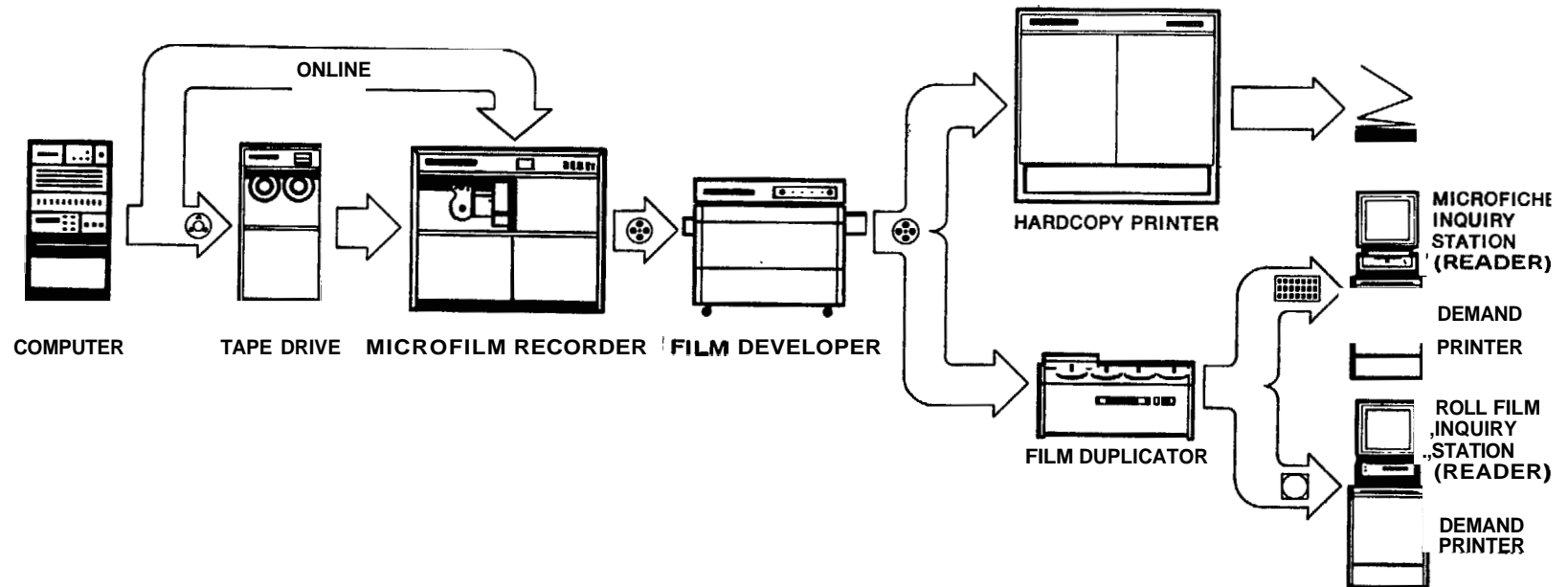
The Federal Government, with over 7,000 computers, is the largest user of automatic data processing (ADP) equipment. These computers process data and produce reports necessary for efficient and effective agency management and are a vital and integral part of Government operations. Computers perform calculations, summarize and consolidate data, and perform processing activities at speeds measured in billionths of a second. However, a problem frequently occurs when processed data is to be printed into report form. Computer printers operate much slower than computer processing units and cannot print information nearly as fast as it is produced.

Computer-Output-Microfilm (COM) has been developed as means of producing computer reports faster and more economically than printers.

COM

COM is a technology enabling the output of computers to be recorded directly on microfilm rather than on paper. It is a blending of the computer, microphotography, and electronics. This process is faster than printing on paper, and the information produced is more accessible and occupies less space than paper reports.

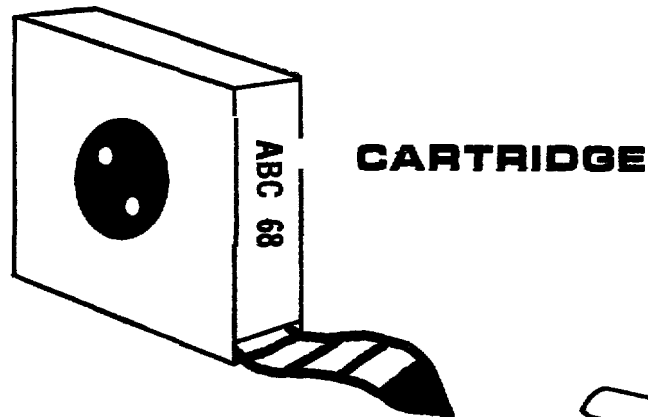
A COM system usually consists of a recorder/developer and a reader. The recorder/developer equipment may be in a single unit or each unit may be separate. The recorder reads computer magnetic tape, reduces the physical size of the data, and transforms it onto film, which is then developed. The reader, the main vehicle for retrieving information on microfilm, magnifies the reduced data on the film so a report user can read it.



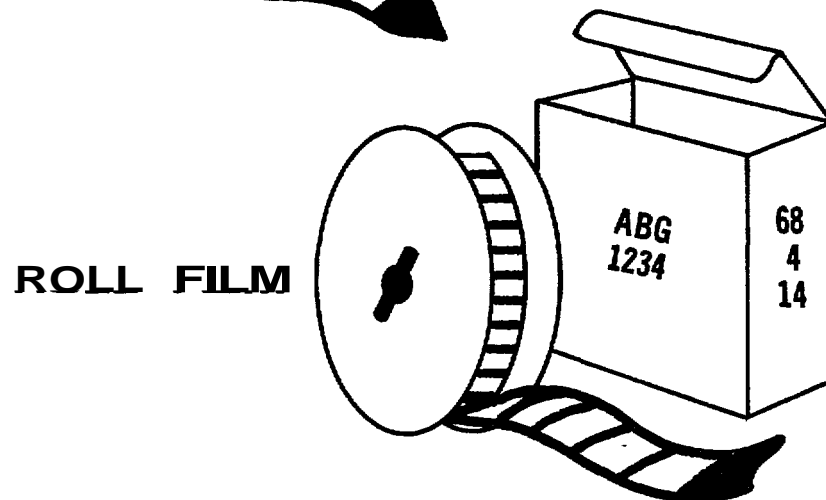
TYPICAL COM SYSTEM

Microfilm is generally of two types, microfiche and rollfilm. Microfiche is a piece of film, usually 4 by 6 inches, on which data is recorded. Rollfilm is film rolled on a spool or put into a cassette or cartridge so that it can be read. Common film sizes in use today include 16 and 35 mm used for rollfilm and 105 mm used for microfiche.

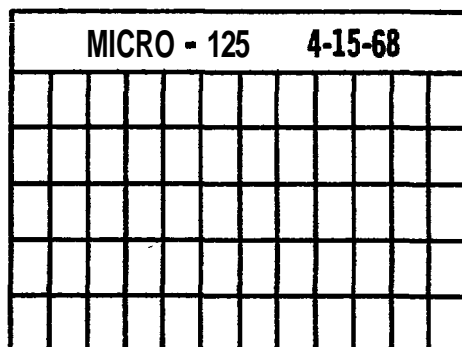
TYPES OF FILM



CARTRIDGE



ROLL FILM



MICROFICHE

The amount of data that can be placed on rollfilm or microfiche depends on the film size (16, 35, or 105 mm) and how much the data is reduced during the recording process (reduction ratio). A reduction ratio of 1 to 48, or 48X, means the image on the microfilm is 1/48th the size of the character that could have been printed on paper. The more common reduction ratios and the amount of data stored by using each are shown below.

Microfiche

(4" x 6")

<u>Reduction ratio</u>	<u>Pages per microfiche</u>	
	<u>8" x 10.5"</u>	<u>11" x 14"</u>
24X	98	63
42X	288	192
48X	392	234

Rollfilm
(note a)

<u>Reduction ratio</u>	<u>Pages per rollfilm</u>	
	<u>16 mm film</u>	<u>35 mm film</u>
24X	2,400	4,800
42X	4,200	16,800
48X	9,600	19,200

a/Based on 11" x 14" pages on 100 feet of film.

COST OF COM EQUIPMENT

The cost of COM equipment varies, depending on the machine's sophistication and capability. Generally, the COM recorder/developer can be rented for about \$50,000 a year. Purchase price for a recorder varies from about \$45,000 to \$275,000, and **separate developer units** range from \$12,000 to \$18,000. Readers for rollfilm or microfiche may be purchased for between \$70 and \$1,400; those capable of printing fullsize copies of the information on the film cost between \$1,000 and \$4,000.

GOVERNMENT-WIDE COM RESPONSIBILITY

Public Law 89-306 (the Brooks bill) authorizes the Administrator of General Services to provide for the

economic and efficient acquisition and use of ADP equipment by Federal agencies. Generally, COM recorder/developers are considered ADP equipment and are the responsibility of General Services Administration (GSA). However, COM use in micropublishing--i.e., printing plates from photonegatives--is considered printing equipment, and the Government Printing and Binding Regulations issued by the Joint Committee on Printing of the Congress govern its installation and use.

This report deals only with that COM considered ADP equipment.

SCOPE OF REVIEW

We studied COM use by Federal agencies to determine whether COM could improve the efficiency and economy of computerized information systems and to explore service centers as a means of economically providing COM services. Most of our work was done in the Norfolk, Virginia, and Washington, D.C., areas where there are concentrations of Federal agencies using ADP equipment.

The review included discussions with GSA; Department of Defense (DOD); Department of Health, Education, and Welfare (HEW); Department of the Treasury; U.S. Postal Service; Atomic Energy Commission; and National Aeronautics and Space Administration personnel who use COM equipment or design computer systems that include it. We reviewed feasibility studies, justifications for COM equipment acquisitions, cost-benefit analyses, and ADP planning documents. We analyzed workload statistics, utilization records, and other files and records related to COM equipment acquisition and use.

CHAPTER 2

COM SYSTEM ADVANTAGES AND DISADVANTAGES

Organizations that install COM systems in their ADP operations have obtained economies and operational benefits, including savings through lower costs for producing, storing, and reproducing computer output. Operational benefits include fast retrieval of information, fast computer output, versatile output formats, and easy handling and distribution of output reports.

PRODUCTION COSTS

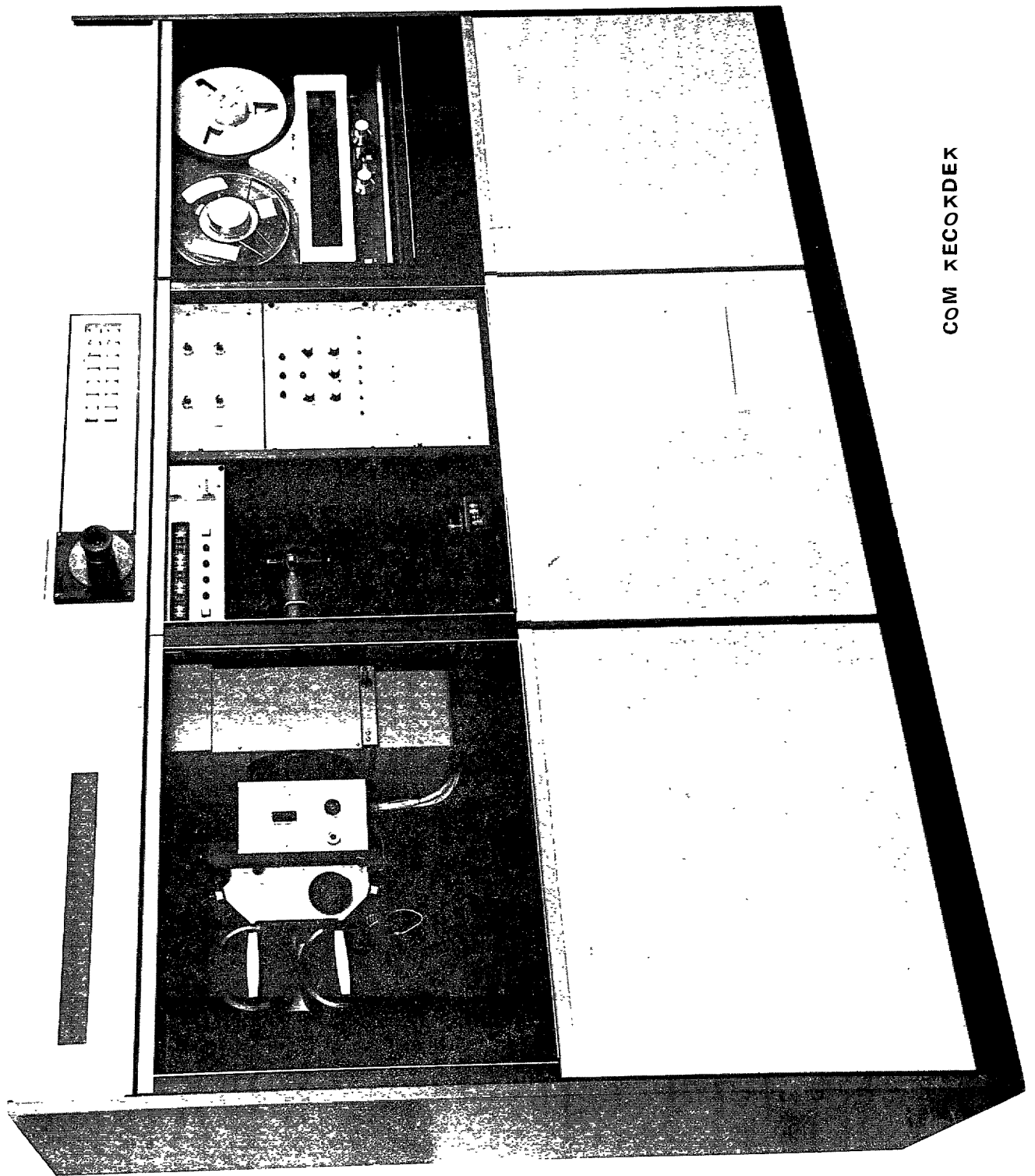
A Defense Supply Agency (DSA) study indicated that computer output could be produced on microfilm for about one-fourth the cost of printing the data on paper. Our analysis of reports at eight Federal activities and discussions with report users indicated that about 1.2 million pages of an estimated 3.9 million pages of reports produced monthly could be converted to microfilm at an estimated annual savings of nearly \$1 million. One DOD activity we visited converted 50 of its paper reports to microfilm and was able to eliminate a computer which had been used solely for printing. This action resulted in estimated savings of nearly \$218,000 over 3 years.

Installations producing 500,000 pages of paper reports each month may be able to reduce report-producing costs by as much as 50 percent by converting to COM.

The following table compares the production cost for 5,000 pages of computer output (paper) with that of microfilm.

	<u>Production costs</u>	
	<u>Paper</u>	<u>Film</u>
Material	\$ 44.00	\$ 8.00
Labor	150.00	12.50

With the cost of paper and labor continuing to rise, savings from COM use should be even higher.



COM RECORDER

STORAGE COSTS

In many cases microfilmed files can be stored in less than 5 percent of the space needed to store paper. Information provided by the Social Security Administration, HEW, showed that an earnings report file containing records for over 200 million people would require 300,000 square feet to store if it were on paper. On microfilm, it requires only 7,000 square feet of storage. Although the Social Security Administration has not measured savings, it estimates that the COM system costs about one-fourth of what a paper system would cost.

REPRODUCTION COSTS

When several users need the same computer reports, a number of copies may be needed. However, most printers can print a maximum of six copies of a paper report. If more copies are needed, they must be reproduced, at a high cost, by copying the material or by rerunning the computer print program. In contrast, duplicating microfilm is fast and inexpensive, and several copies can be produced as needed. At one installation we visited, users were charged only 15 cents to reproduce a microfiche which could contain up to 270 pages of information.

FASTER INFORMATION RETRIEVAL

Computer output on microfilm can be retrieved faster than data printed on paper. Typically, between 2 and 15 minutes is required to locate information in paper reports. Information on microfilm usually can be located in less than 30 seconds. Industry studies indicate that, on the average, 4 minutes is required to retrieve needed information from a paper printout. To retrieve information from film, only 1 minute is required. With the more sophisticated COM systems, retrieval time can be further decreased.

A supply control system at the Naval Supply Center, Charleston, South Carolina, uses microfilm to produce stock status reports and other inventory information. Only 800 man-hours are now needed to retrieve stock status information, compared with about 2,500 man-hours when paper was used.

FASTER COMPUTER OUTPUT

Computer printers, because they are the slowest equipment in a computer system, frequently become a bottleneck,

slowing system output. The computer operates at speeds thousands of times faster than the printers and produces information faster than it can be printed on paper.

COM recorders operate at high speeds, compared with printer speed. On the average, a single COM recorder can produce as much as 30 printers. Typically, computer printers can print a maximum 1,000 lines a minute; some can print up to 2,000 lines a minute. The average COM recorder records about 20,000 lines a minute, and some can record up to 50,000 a minute. using COM as the output medium can reduce the time required to prepare reports and also allow users access to their information faster than if printers are used.

VERSATILE OUTPUT FORMATS

COM recorders are more versatile than printers and allow a greater range of output formats. They can print characters of various styles, sizes, intensities, and even colors. Selected information may be emphasized by italics or underlining, and a variety of charts and graphs can be produced because most COM recorders have graphics capability. Although charts and graphs can be plotted on paper, plotters are relatively slow and expensive. COM recorders allow easier identification of important information and make the report more meaningful to users.

EASIER HANDLING AND DISTRIBUTION

Computer printouts can be large and bulky; carbons must be removed, pages separated, and the report bound. Printouts require considerable handling, are difficult to distribute, and require large volumes of storage space. By comparison, microfilm processing and handling is simpler. Film developing has been automated; duplicating master films, as indicated earlier, is simple and inexpensive; and the product is compact. For example, a single microfiche can hold 270 pages of printed data; 5 of these, holding 1,350 pages of information, weigh a little more than an ounce and take up less space than a small magazine. The equivalent information on paper would weigh about 5 pounds and require about as much space as an attache case.

Although COM systems have many advantages, some people are reluctant to use COM. Major factors inhibiting COM acceptance are the strangeness of the medium and the lack of knowledge of COM benefits.

STRANGENESS OF COM

Almost everyone has worked with paper and is comfortable with it. Since microfilmed reports are new and different, some people tend to reject them.

COM reports require a machine for reading and cannot be written upon. People used to reading and marking paper reports are reluctant to change their methods and accept COM reports; however, a good training program can help them overcome this reluctance. Many people prefer COM reports when they become familiar with COM.

LACK OF KNOWLEDGE

Perhaps the biggest factor inhibiting COM acceptance is that most people are unaware of its advantages and potential for improving information systems. When systems are developed, the designers usually rely on paper reports and do not consider COM.

Feasibility studies involving COM often are simple, only comparing paper and film costs. Evaluation of a proposed microfilm system should include all film processing, duplicating and inspection requirements and should insure that all direct and indirect costs are included in a comprehensive costing of alternatives. More important, the nature of the information system and the effect of changing to COM should be reviewed in the feasibility study. As COM becomes generally accepted, Federal managers and systems designers will become more aware of the benefits of COM and its advantages.

CHAPTER 3

COM USE BY FEDERAL AGENCIES

COM emerged as a technological breakthrough in 1958 when a special model was designed and built for the Social Security Administration. For the first decade after its introduction, COM's growth was relatively slow, and by 1968 only 150 systems were in use in the United States. Beginning in 1968, COM growth has been rapid, and over 1,000 systems were installed by 1972. Industry sources estimate that over 3,000 will be in use by 1975. A recent study by a major consulting firm predicts that the market for COM will accelerate rapidly. The Federal Government, now a major COM user, will participate in COM's future growth.

AGENCIES USING COM

GSA has not kept an inventory of purchased and leased COM equipment; therefore it is difficult to ascertain which agencies use COM. We did not survey all agencies; however, we did find agencies in Norfolk and Washington, D.C., which either have COM systems or plan to acquire them. These include

- DOD,
- HEW,
- the Department of the Treasury,
- the Atomic Energy Commission,
- GSA,
- National Aeronautics and Space Administration, and
- the United States Postal Service.

The above list is not all inclusive but illustrates that several large agencies are using COM systems. Other agencies share COM units procured by these agencies or purchase services from commercial service centers.

COM APPLICATIONS

COM systems appear best suited to applications with a high volume of historical data maintained in sequence. Generally, it does not work well where records are constantly updated. The following examples show COM applications used by DOD organizations. These examples are not intended to show all possible applications but to illustrate situations where cost savings and other benefits were obtained through implementing COM systems.

DSA

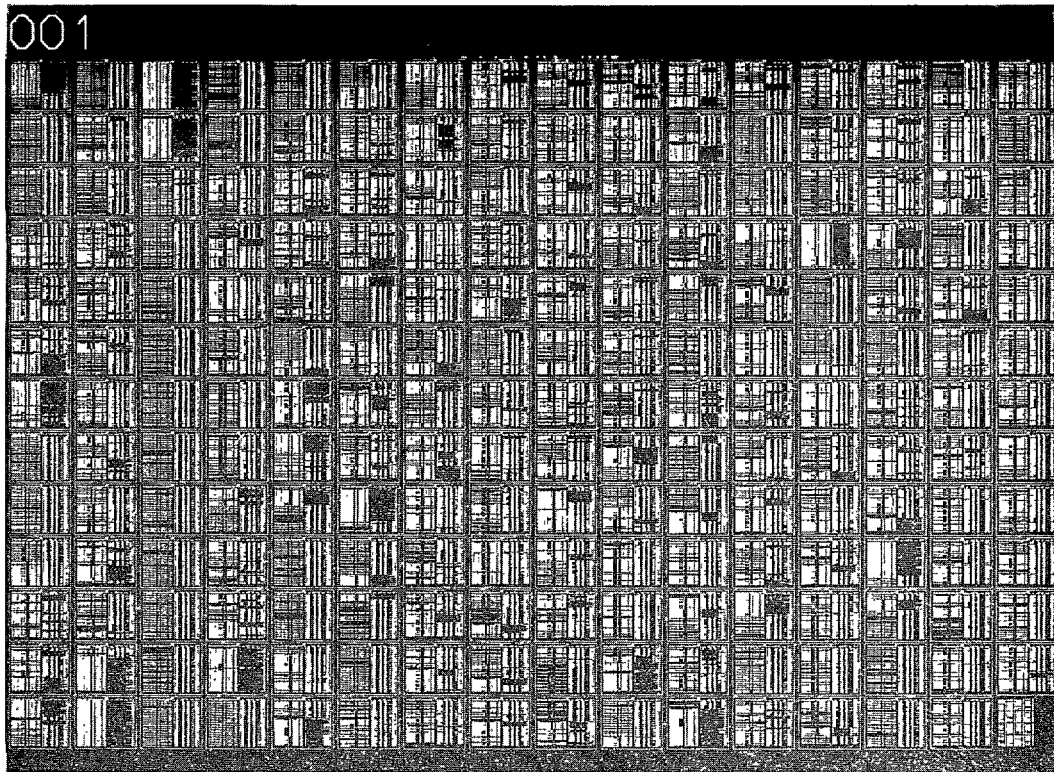
The miniaturization of the Federal Catalog Systems Publications (MINICATS) was a DOD study initiated in July 1971 which directed the conversion of the Federal Catalog Publication to a **48x** microfiche format. The study showed it cost \$9.1 million to produce the catalogs on a hardcopy and 16 mm cartridge media while the **48x** microfiche production costs were estimated at \$2.8 million for the same catalogs. In addition to showing cost savings, the study showed that microfilmed catalogs could be produced and distributed faster than paper catalogs.

The MINICATS program is continuing, and DSA has supplied DOD users with more than **26,000** microfiche readers at installations all over the world. The program uses microfiche at a reduction rate of **48x** with **270** pages of data per fiche. As a result of this program, DOD has adopted **48x** as a standard reduction ratio.

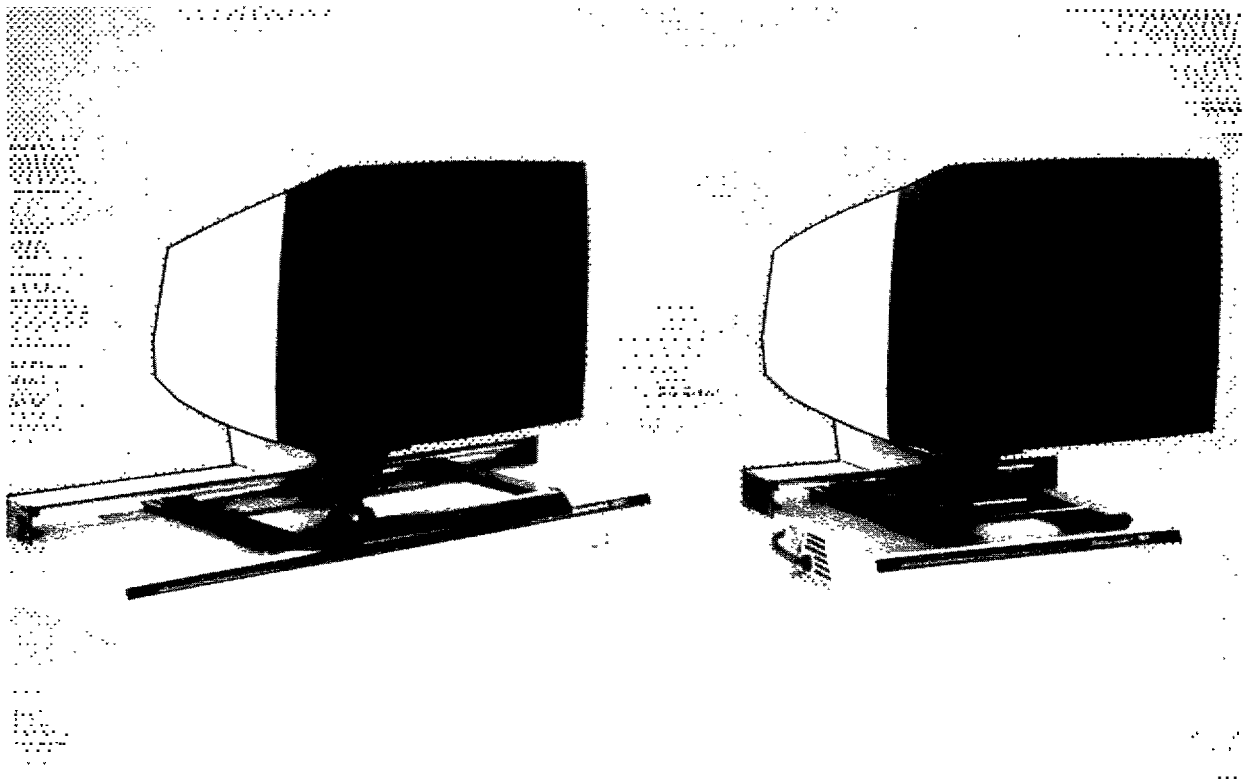
Navy-Federal catalog data miniaturization program

The Navy supply system distributes 15 catalogs to users worldwide. The Navy Management Data List (NMDL), the most widely distributed catalog, has over 6,000 customers. Before 1969, the NMDL was printed on paper, weighed **42** pounds, and had to be mailed fourth class. Because of the printing cost, full catalogs were issued only at irregular intervals and updates were provided between full printings.

In 1969 part of the NMDL was converted to microfiche on a test basis. The paper and printing cost was eliminated, and the microfiche NMDL could be stored in about one-tenth the space required by paper catalogs. Because it weighed only 8 ounces, it could be airmailed to users. The test proved successful, and in August 1972 the entire NMDL was converted to microfiche. Because microfiche is inexpensive, the NMDL is now published every 3 months, and no updates are needed.



MICROFICHE



MICROFICHE READER

Master data record at Naval Air Rework Facility

The master data record (MDR) is the basic document controlling workloads through the Naval Air Rework Facility. It contains routing information, standard repair times, technical data on an item, skill codes required, facility limitations, and other information.

The MDR file exceeded 80,000 printed pages. To keep the file current, changes were printed weekly and distributed to users who removed old pages and inserted new ones. Many filing mistakes were made; and, when massive changes occurred, the file often became hopelessly out of date. Distribution of the MDR file was restricted because of the high cost of keeping it current. This restriction resulted in numerous phone calls to obtain routine data on **components brought in for repair, and this required additional man-hours.**

After its conversion to microfilm, the MDR file could be economically updated weekly and four copies could be provided to users. The functions of deleting old pages and inserting updated pages were eliminated, resulting in a more accurate file. Because of wider distribution, individuals have better access to needed information and the phone calls required under the old system are no longer necessary.

Army Materiel Command inventory application

In 1967 the Army Materiel Command compared the cost of preparing ADP inventory reports using COM with the cost of printing the reports on paper. This work was done at three Army installations and involved converting to rollfilm those reports which required over 1 hour to print.

The study showed that the cost of the COM system would be offset by a reduction in expenditures for paper. COM reports were distributed faster and the efficiency of personnel using reports was increased by as much as 100 percent. Information retrieval time, which formerly required 2 to 15 minutes, was reduced to under 30 seconds. Other advantages of COM included improving information control, eliminating massive card files, and relieving a space squeeze.

The COM program has been expanded to all major Army commands, and 12 additional recorders have been installed.

Marine Corps payroll

In 1967 the Marine Corps' integrated active duty pay-personnel system was evolving. This system required that information on personnel be provided twice monthly to over 2,000 units throughout the world. Over 300,000 lines of information are supplied biweekly. The Marine Corps decided that microfilm was the most practical medium for providing the information.

The major benefits obtained by using COM include reducing computer time, paper consumption, and shipping and mailing costs. Costs of running one application dropped from \$21,000 each time it was run using paper to about \$300 using microfiche.

CHAPTER 4

METHODS OF PROVIDING COM SERVICES

An agency may provide for its COM production needs by either establishing an in-house installation or using a service center. In a service center operation, a single COM recorder/developer serves the needs of a number of agencies, which share the cost of operation. Each agency avoids the expense of acquiring and operating its own COM equipment.

COM service centers are not widely accepted by Federal agencies. There is a tendency for agencies to provide only for their own COM needs and give little consideration to sharing equipment with other agencies which have COM requirements.

IN-HOUSE COM INSTALLATIONS

The Norfolk area has a concentration of Federal activities using computer equipment (22 military commands and 2 civilian agencies). Several of these organizations have COM equipment or are planning installations.

In some cases the COM facilities were established on the basis of short-run agency needs without exploring the possibility of interagency equipment sharing. The Naval Air Station (NAS) in Norfolk installed COM equipment in May 1972 to test and explore its use. The COM reader and developer were tailored to fit NAS needs and ADP equipment characteristics. They did not consider whether other agencies had needs for COM services.

The equipment has a practical capacity of 7,000,000 frames of microfilm a month in 500 hours of operation. An average 300,000 frames monthly are now produced, about 4.3 percent use. Even though considerable capacity is not needed by NAS, services to other agencies have been provided only on a small scale.

At the time the NAS COM facility was underused, other agencies in the Norfolk area were planning to acquire equipment or were using commercial service centers. In January 1972 the Tactical Air Command Chief of Staff initiated a study of the feasibility of a microfilm service center at Tactical Air Command headquarters, Langley Air Force Base. The study, completed in December 1973, recommended establishing a service center capable of satisfying the microfilm requirements at Tactical Air Command headquarters and

other functions located at Langley Air Force Base. The study was made independently of similar studies at other DOD agencies in the area and did not consider using the COM equipment at NAS.

In November 1973 the Army Training and Doctrine Command, Fort Monroe, Hampton, Virginia, contracted with a commercial COM service company to convert 19 reports to microfiche.

During fiscal year 1972, NAS officials said they could not provide extensive microfilm services to other agencies, even on a cost-reimbursable basis, because of personnel ceilings. In fiscal year 1974, personnel ceilings were increased and service capabilities were expanded, but as of January 1974 very little additional microfilm services had been provided to other agencies.

An individual agency may obtain benefits, lower costs, and better service by using a COM recorder and developer, but the equipment may not be used efficiently. The capacity of this equipment is so great that usually no single agency has enough computer output to keep it operating full time. Consequently, when an agency has COM equipment for its exclusive use, the system is frequently underused. A better way of using COM recorders and developers appears to be through establishing service centers which service the needs of a number of agencies.

COM SERVICE CENTERS

COM service centers capable of providing diverse, prompt services could make COM's advantages available to Federal agencies and increase equipment use. A potential user realizes startup savings through eliminating COM system design, selection, and installation costs; hiring and training of operator personnel, as well as eliminating lost production time awaiting installation and testing. Other advantages of the service centers are savings through economies of scale and the development of a wider community of users. A service center would centralize a high degree of expertise where users could obtain answers to COM questions and thereby enhance COM's early acceptance for appropriate applications and avoid inappropriate applications.

Some agencies have established COM service centers to meet their needs and those of other agencies. For example,

the HEW Data Management Center has been designated as a Federal data processing center and offers microfilm conversion, processing, and duplication services. Beginning in August 1972 the center has provided COM services to 4 agencies within HEW and 10 other departments and bureaus.

Use of the center has continually increased. The equipment was originally justified on an expected volume of about 300,000 frames of microfilm a month. In fiscal year 1974 the average monthly volume reached 510,000 frames, and center officials expect it to reach 1,200,000 frames in fiscal year 1975. The center is about to start a second-shift operation. According to HEW officials, the volume of work done by the center should continue to increase. Recently, four additional agencies have inquired about using the center, and more can be expected as the price of paper continues to increase.

One reason for the success of the HEW center is that it provides economical service. During our review the charge for recording on 16 mm and 105 mm film was \$12 per thousand frames. Duplication of 16 mm film cost \$2.50 per thousand and 15 cents per microfiche for 105 mm film. It would be difficult for any agency with its own machine to provide such economical service.

In addition, the National Institutes of Health offers COM services through its service center arrangement in the Washington, D.C., area. However, COM service centers are not accepted Government-wide and have not been provided in other sections of the country. When we started our work, COM centers were not available in the Norfolk area, despite a concentration of Federal activities. Several agencies either had COM equipment or were planning to install it.

Recognizing that there could be an undesirable proliferation of COM equipment resulting in excessive costs, we proposed to the Office of Management and Budget (OMB) a joint COM study.

PROPOSAL FOR COM STUDY

We suggested to OMB that executive agencies join with GAO in a study to determine efficient and effective methods for acquiring and using COM technology. Our suggested approach was to determine the feasibility of establishing interim COM service centers in certain geographical areas as a means of both giving economical service and controlling proliferation of systems while studying the long-range needs for COM technology.

OMB agreed with us and proposed that its representatives and those of GSA, our Office, and other Federal agencies be named to a steering committee charged with forming a study plan, arranging its conduct, and reviewing the results and making recommendations. A steering committee was established with the DOD representative as chairman. At the committee's first meeting on June 21, 1973, a project team was named to conduct a feasibility study for a pilot COM center in the Norfolk area. The Navy Publication and Printing Service agreed to act as the COM service center. The steering committee is monitoring the center's operation and plans to issue a final report in July 1975.

The committee, in addition to monitoring the service center, plans to:

- Study and propose (if warranted) a Federal policy on acquiring and using COM systems.
- Study whether COM equipment standards are needed now and the future need for standards.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS, AND AGENCY ACTIONS

CONCLUSIONS

COM can improve the economy and efficiency of many Government information systems. Increased use in such areas as payroll could decrease operating costs and yield other advantages. However, COM has not been fully used because many Federal managers and system designers are unaware of its benefits.

Service centers have the potential to provide COM services to a number of users at low cost to the Government. As COM becomes more widely accepted and demand for services grows, even greater economies should result. However, service centers are not as widely used as they could be.

Although the joint steering committee and the pilot service center have been established, more action is needed to make agencies aware of COM. GSA should initiate a program to make Federal managers and system designers aware of COM benefits. Pending completion of the pilot project, GSA should encourage agencies to use service centers, where possible.

RECOMMENDATIONS

We recommend that, for orderly and productive use of COM equipment, GSA:

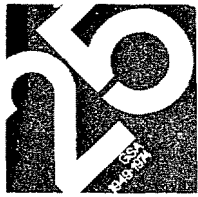
1. Inform Federal managers of the benefits of using COM.
2. Suggest that agencies investigate whether COM could increase productivity and lower the cost of information systems.
3. Encourage Federal agencies to share existing COM equipment, especially in areas where Federal agencies are concentrated.

AGENCY ACTIONS

To make Federal managers more aware of the advantages of COM, GSA is preparing a handbook on the analysis and design of COM information systems and is sponsoring a Federal

Government Micrographics Council. Shared COM use will be promoted as part of the Government-wide ADP Sharing Program, and the activities of the Micrographics Council and availability of the COM handbook will be publicized. According to GSA, procurement requests for COM equipment and services are reviewed **as** part of the ADP Sharing Program. GSA plans to strengthen its efforts by revising the Federal Property Management Regulation² to make agencies more aware that COM equipment and services are included in the ADP Sharing Program. (See app. I for GSA comments.)

Because many of the COM installations discussed in this report are military, we asked DOD for its comments. DOD concurred in the conclusions and recommendations. The Assistant Secretary of Defense said the report should provide needed emphasis on COM as an alternative to printed computer output and should increase the efficiency of existing and planned COM usage through sharing of resources. He also said DOD would continue working closely with our Office and GSA to exploit the full potential of COM. (See app. II for DOD comments.)



General
Services
Administration

Washington, D.C. 20405

APPENDIX I
Automated Data and
Telecommunications

AUG 28 1974

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
Washington, DC 20548

Dear Mr. Staats:

We appreciate the opportunity to review your draft report, "Opportunities for Savings through Increased Computer-Output-Microfilm use by Federal Agencies," dated June 25, 1974, and offer the following comments,

Our efforts, both within the agency, and attempts to market computer output microfilm (COM) service to other agencies, have been discouraging. As the study relates, this **is** due primarily to the lack of awareness on the part of the users of ADP products as to the advantages of COM over hard copy printouts.

In an effort to solve the above problem, **GSA** is preparing a handbook on the analysis and design of COM information systems, and is sponsoring a Federal Government Micrographics Council. **GSA** will promote shared use of COM as an integral part of the Government-wide ADP Sharing Program. As part of this effort, the activities of the Micrographics Council and the availability of the COM Handbook will be publicized.

In addition, procurement requests for COM equipment and services are reviewed as part of our ADP Sharing Program. We plan to strengthen our efforts and make agencies aware that COM equipment and services are included in the ADP Sharing Program by revising the FPMRs.

COM, and specifically centralized COM service centers, are not always the most economical or best way to solve an agency's problem. In our opinion, greater emphasis **is** needed on the overall

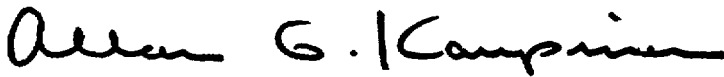
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APPENDIX I

system design aspects of the total **COM** information system, and on improving the processing of recorded information within agencies. If service centers are used, in order to serve as wide a market as possible, the center must provide the capability to handle a variety of computer magnetic tape formats. A key factor in gaining customers for a **COM** service center will be providing them with competent systems analysis and programming advice to aid them in converting to **COM** use.

If there are any questions, please let us know.

Sincerely,

A handwritten signature in black ink that reads "Allan G. Kaupinen". The signature is written in a cursive, flowing style.

Allan G. Kaupinen
Assistant Administrator



COMPTROLLER

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

19 AUG 1974

Mr. D. L. Scantlebury
Director, Division of Financial &
General Management Studies
U. S. General Accounting Office

Dear Mr. Scantlebury:

Reference is ~~made~~ to your letter of June 26, 1974 with enclosed draft report on "Opportunities for Savings Through Increased Computer-Output-Microfilm Use by Federal Agencies" (OSD Case #3771).

The subject report should provide much needed emphasis for the consideration of Computer-Output-Microfilm (COM) as an alternative to the increasingly expensive printed computer output. Further, it should serve to increase the efficiency of existing and planned COM usage through sharing of resources or consideration of service center support.

As the report indicates, the Department of Defense shares your belief in the potential of COM systems for improving the economy and effectiveness of many information systems and has in fact been a leader in the Federal community in COM usage.

We concur with the conclusions and recommendations of the report and will continue to work closely with GAO and GSA in endeavoring to exploit the full potential of COM.

(See GAO note.)

Sincerely,

Terence E. McClary
Terence E. McClary
Assistant Secretary of Defense

GAO note: Detail comments considered in finalizing the report have been deleted.

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